IN THE U.S. PATENT & TRADEMARK OFFICE

Applicants:	Yukoh HIEI et al		
Serial No.:	10/089,696	Group:	1661
Filed:	July 24, 2002	Examiner:	Kubelik
For:	Method for Promoting Efficiency of Gene Introduction into Plant Cells		

DECLARATION UNDER 37 C.F.R. § 1.132

Honorable Commissioner of Patents and Trademarks

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Sir:

I, Yukoh HIEI, a nation of Japan, residing at c/o Japan Tobacco Inc., Plant Breeding and Genetics Research Laboratory, 700, Higashibara, Toyoda-cho, Iwata-gun, Shizuoka 438, Japan, do hereby declare as follows:

I am a co-applicant of the invention as described and claimed in the specification of the above-identified application.

I am familiar with the Office Action dated January 8, 2009, in which claims 22 - 30 are rejected.

To show the patentability of the present invention, I carried out the experiments described below.

Materials and Methods

(1) *Agrobacterium* Strain and Plasmid

As the *Agrobacterium* and its vector, LBA4404(pSB134) (Hiei and Komari, 2006) was used. The T-DNA region of pSB134 has a hygromycin-resistant gene (*hpt*) regulated by maize ubiquitin promoter and a GUS gene regulated by the 35S promoter

of CaMV and having the first intron of the catalase gene of castor-oil plant.

(2) Sample Varieties and Tissue

As the sample variety, Yukihikari, which is the variety of Japonica rice, was used. As the sample tissue, immature embryo was used. The preparation method of the tissue is the same as that described in the specification of the present patent application.

(3) Centrifugation Treatment

Rice immature embryo was placed in a 1.5 ml centrifugal tube containing 1 ml of sterilized water. The tube was subjected to centrifugation treatment for 1 second, 10 seconds or 60 seconds at 1,000 xg, or 1 second at 20,000 xg. In addition to the experimental plots with these accelerations, an experimental plot with no centrifugation was added, thus, five experimental plots were prepared in total. In each experimental plot, 15 immature embryos were used. After the centrifugation, the immature embryos were infected with *Agrobacterium*.

(4) Infection of *Agrobacterium* and Co-culturing

The method of infection of the immature embryos with *Agrobacterium*, the method of co-culturing and the method of GUS assay of the immature embryos after the co-culturing were the same as described in specification of the present patent application. In the present test, the GUS expression levels in the immature embryos were expressed in values as GUS Activity Index as follows: Each of the immature embryos was then visually examined for the percentage of the sum of the blue areas to the total surface area of the scutellum. A score was given according to the percentage; score 0.0 was given for 0%, score 0.5 for between 0% and 1%, score 5.5 for between 1% and 10%, score 17.5 for between 10% and 25%, score 37.5 for between 25% and 50%, score 62.5 for between 50% and 75%, and score 87.5 for 75% and 100%. The average of the scores in an experimental plot was recorded as the GUS Activity Index. The co-culturing was carried out for 6 days. The experiment was carried out two times.

Results and Discussion

A tendency was observed that the growth of the hypocotyl is inhibited and the scutellum is grown during the co-culturing in the immature embryos subjected to centrifugation. The state of GUS expression in the immature embryos after the co-culturing is shown in Figure 1 and 2. The percentage of the area in the scutellum, which showed GUS expression was apparently increased by the centrifugation treatment when compared with the non-treated group (Figures 1 and 2, and Table 1). In cases where the centrifugation at 1,000 xg was performed for 1 second, 10 seconds or 60 seconds, the GUS-expressed area was not so different among the groups (Figure 1 and 2, and Table 1). In contrast, in the group subjected to 20,000 xg for 1 second, the percentage of the GUS-expressed area was considerably increased when compared with the cases in the groups subjected to 1,000 xg (Figures 1 and 2, and Table 1). Thus, the centrifugation treatment at 1,000 xg or more has an effect to prominently increase the gene transfer efficiency even if it is performed for very short duration such as 1 second.

Cited Reference

Hiei Y, Komari T (2006) Improved protocols for transformation of indica rice mediated by *Agrobacterium tumefaciens*. Plant Cell, Tissue Organ Culture 85, 271-283

Table 1. Transient GUS activity in immature embryos after co-cultivation with *A. tumefaciens* LB4404(pSB134). The immature embryos were pretreated with or without centrifugation.

Pretreatment with centrifugation		GUS Activity Index	
		Variety	
Centrifugal acceleration (xg)	Time (second)	Yukihikari; experiment 1	Yukihikari; experiment 2
No centrifugation	–	5.8	4.6
1,000	1	17.8	13.0
1,000	10	16.2	13.2
1,000	60	13.2	14.9
20,000	1	38.0	59.2

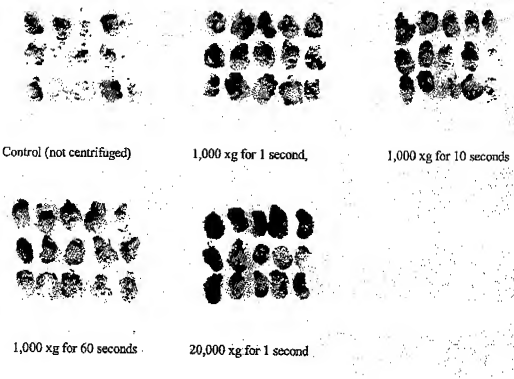

Figure 1. Experiment 1; Histochemical GUS expression in immature embryos of Yukihikari after co-cultivation with *A. tumefaciens* LB4404(pSB134). The immature embryos were pretreated with or without centrifugation.

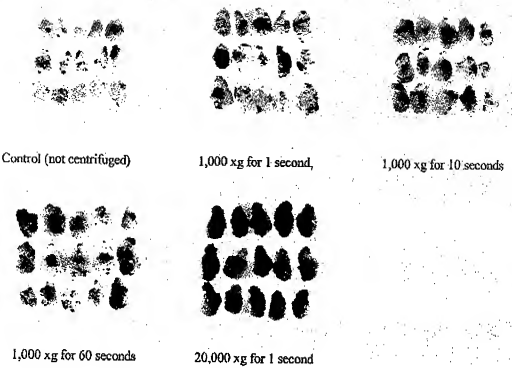

Figure 2. Experiment 2; Histochemical GUS expression in immature embryos of Yukihikari after co-cultivation with *A. tumefaciens* LB4404(pSB134). The immature embryos were pretreated with or without centrifugation.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

This 5 day of June, 2009

Yukoh Hiei

Yukoh HIEI